

## REMARKS

Applicants respectfully request consideration of the foregoing amendments and the following reasons upon continued examination of the present application.

### **I. Status of the Claims**

Claims 1-26, 30 and 42 were cancelled previously. Claim 27 has been amended to incorporate certain recitation of claim 45, and claims 45 and 46 have been amended accordingly for greater clarity and for correct dependency. Claim 56 has been added with exemplary support in the original specification, e.g., Example 5, at page 21, in the table. Because no new matter is introduced, Applicants respectfully request entry of this amendment. Upon entry, claims 27-29, 31-41 and 43-56 will be pending, with claims 31, 50, 52 and 54 withdrawn from examination.

### **II. Rejection of Claims under 35 U.S.C. §103(a)**

#### **A. Miyake and Lynglev**

Claims 27-29, 32-41, 43, 44, 46-49, 51 and 55 are rejected for allegedly being obvious over U.S. Patent No. 3,862,005 to Miyake *et al.* and U.S. Published Application No. 2003/0113405 by Lynglev *et al.* Applicants respectfully traverse the rejection.

The base claim has been amended to include the recitation of claim 45, which is not rejected over the Miyake / Lynglev combination. Moreover, the examiner explicitly acknowledges that “[n]either reference ... teaches addition of catalase and hydrogen peroxide in order to add oxygen to the reaction.” Final Office Action at page 8, last full paragraph.

The present claims are directed to a lactobionic acid-production process entailing the addition of a carbohydrate oxidase and a catalase to a dairy substrate. Thus, it follows from the foregoing that the claims are non-obvious over the Miyake / Lynglev combination. Withdrawal of the rejection is respectfully requested, therefore.

#### **B. Miyake, Lynglev, and Rand**

Claims 27-29, 31-41, 43-49, 51, 53 and 55 are rejected over Miyake in view of Lynglev and Rand

*et al.*, *Journal of Dairy Science* 58:1144-50 (1974). Applicants traverse the rejection.

**1. *Rand fails to teach that any catalase can be used by itself in a lactobionic acid production process***

According to the examiner, the combined teachings of Miyake and Lynglev “arrive at nearly all elements of the claimed invention” but fails to teach addition of catalase and hydrogen peroxide. Rand allegedly remedies the acknowledged deficiency by teaching “addition of catalase and hydrogen peroxide in order to add oxygen to the reaction.” Final Office Action at page 8, last full paragraph (emphasis added). The examiner also states that the skilled artisan would have been motivated to add hydrogen peroxide and catalase to improve the rate of the reaction because the reaction is oxygen-dependent. *Id.* at page 9, lines 1-7.

The examiner is mistaken, however, that Rand provides the requisite motivation to have combined these references and that Rand is sufficient to cure the deficiencies of Miyake and Lynglev, thereby arriving at the claimed invention. This is because Rand teaches the use of a species of the catalase and explicitly requires “the combination of hydrogen peroxide and catalase” for the process (page 1144, “Introduction,” in the final two sentences; emphasis added).

Conversely, Rand provides no guidance on how to use one of hydrogen peroxide and catalase in producing lactobionic acid, as presently claimed, when the addition of hydrogen peroxide is optional. In his “Introduction,” that is, at page 1144, Rand in a single sentence mentions the use of hydrogen peroxide and catalase in combination, but he is silent on how the combination or, particularly, the catalase alone might be so employed. Instead, Rand elaborates on the selection and use of commercial glucose oxidase, which “contain[s] appreciable amounts of catalase” (page 1146, right column, 1<sup>st</sup> paragraph). More specifically, Rand teaches that glucose oxidase C is more desirable over other oxidases because “the catalase content of glucose oxidase C is lower than others” (*id.*, left column, last 4 lines; emphasis added).

Rand further states that, “[w]hen the catalase concentration in glucose oxidase is too high, a rapid release of oxygen from the added hydrogen peroxide takes place, causing rapid initial pH change. Foaming in the milk is produced which decreases total acid production.” *Id.*, right column, lines 6-12. When the combination of catalase and hydrogen peroxide is used, Rand further cautions that these

ingredients must be kept within a particular ratio to avoid any negative impact. See page 1147, the paragraph spanning the columns.

Thus informed by Rand, the skilled artisan would have concluded that not all catalases are suitable for the lactobionic acid production process and that, even when a catalase is used, it should be combined with hydrogen peroxide. The examiner seems to disregard Rand's teaching that only certain species of catalase can be used in the process, and he unduly generalizes Rand's teaching to implicate any catalase, thereby to reach applicant's claimed invention without the requisite factual support.

From the foregoing it is apparent that Rand does not evidence a motivation in the prior art for combining the references, as posited, simply because the reaction is oxygen-dependent and, as the examiner asserts, more oxygen therefore is better. Rather, Rand requires **combining** hydrogen peroxide and catalase, and cautions, for the fear of negative effects, about the use of certain species of catalase at specified ratio to hydrogen peroxide. The examiner thus unduly generalizes Rand's teachings, overreaching with inadequate foundation in the art to reach applicants' claimed invention.

**2.     *The claimed invention is non-obvious in view  
of the unexpected results***

Additionally, the accompanying Rule 1.132 declaration by co-inventor Per Munk Nielsen ("the Nielsen Declaration") demonstrates that unexpected results are achieved with applicants' claimed invention, further substantiating its patentability. Thus, the declarant shows that an oxidase alone resulted in only 41% of the conversion rate, whereas the presence of a catalase significantly increased the conversion rate to 100%. See the Nielsen Declaration, paragraph 6. Moreover, the addition of a strong base was associated with completed conversion in 6.5 hours, while added weak base effected conversion in 4.5 hours. *Id.*, paragraph 7.

It was wholly unexpected, in light of the contemporaneous art, that the presence of a catalase and a weak base significantly increases the conversion rate while reducing the conversion time. These results are unexpected because nothing in the art predicted that a catalase and a weak base would improve the conversion process, as is the case with applicants' claimed invention.

In view of the foregoing, the rejection under Section 103(a) should be withdrawn.

**III. Double Patenting Rejection**

Claims 27-29, 31-41, 43-49, 51, 53 and 55 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting over claims 1-15 of Application No. 11/621,819 in view of Miyake and Lynglev. Applicants respectfully submit that the '819 application has been abandoned, thereby rendering the provisional double patenting rejection moot.

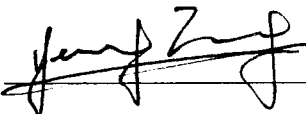
**CONCLUSION**

Applicants submit that the present application is in condition for allowance, and they request an early indication to this effect. Examiner Macauley is invited to contact the undersigned directly, should he feel that any issue warrants further consideration.

Respectfully submitted,

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FOLEY & LARDNER LLP  
Customer Number: 22428  
Telephone: (617) 342-4039  
Facsimile: (617) 342-4001

By  for  
Stephen A. Bent  
Attorney for Applicant  
Registration No. 29,768  
**YANG TANG**  
**Reg. No. 55,663**

The Commissioner is hereby authorized to charge any additional fees, which may be required under 37 C.F.R. §§ 1.16-1.17, and credit any overpayment to Deposit Account No. 19-0741. Should no proper payment accompany this response, then the Commissioner is authorized to charge the unpaid amount to the same deposit account. If any extension is needed for timely acceptance of submitted papers, then applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of the relevant fee(s) from the deposit account.